



**DEPARTMENT OF ENERGY  
Nevada Operations Office  
Las Vegas, NV**

**DOE ORDER 232.1  
TRENDING & ANALYSIS  
REPORT**

**First Quarter**

**1997**

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## INTRODUCTION

This Department of Energy, Nevada Operations Office (DOE/NV) Quarterly Trending & Analysis Report (QT&AR) covers the first quarter of 1997. The DOE/NV QT&AR includes data from the Occurrence Reporting and Processing System (ORPS) calendar quarter, which ended March 31, 1997.

The DOE/NV QT&AR is based on DOE/NV ORPS reports issued under DOE Order 232.1, *Occurrence Reporting and Processing of Operations Information* and its earlier versions. This report consists of a management summary and statistical data on occurrences reported by DOE/NV and its contractors/users. Also, included are items of interest from events occurring at other DOE locations.

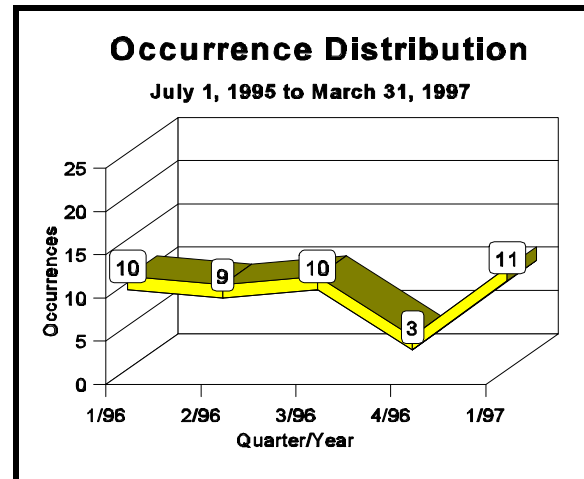
Not all of the active 11 DOE/NV contractors/users registered in ORPS as Facility Managers (FMs) for DOE/NV's active 39 facilities, will appear in this report. The QT&AR includes only the DOE/NV contractors/users who submitted occurrence reports in ORPS.

The abbreviations (recognized by ORPS) for the DOE/NV contractors/users appearing in this report follow:

BNLV	Bechtel Nevada
DSWA	Defense Special Weapons Agency
GONV	Nevada Operations Office
ITNV	IT Corporation
LANV	Los Alamos National Laboratory - Nevada
LLNV	Lawrence Livermore National Laboratory - Nevada
SDNL	Sandia National Laboratory, Nevada
WSIN	Wackenhut Services, Inc.

## MANAGEMENT SUMMARY

This section summarizes general trends, observations, and lessons learned during the compilation, evaluation, and reporting of occurrences for this quarter. Eleven new reports for this quarter were identified from ORPS based on the occurrence discovery date.



### Occurrences by Contractor August 1, 1990 to March 31, 1997

BNLV		DSWA		GONV		ITNV		LANV		LLNV		SDNL		WSIN	
Total	Qtr	Total	Qtr	Total	Qtr	Total	Qtr	Total	Qtr	Total	Qtr	Total	Qtr	Total	Qtr
22	3	2	0	8	1	1	0	4	1	14	0	5	1	67	5

### Emergency

DOE/NV has never categorized an event as an "Emergency" since the start of ORPS.

### Unusual Occurrence

DOE/NV categorized two events as Unusual Occurrences (UOs) this quarter. They were reported under the Safeguards/Security ORPS reporting area.

DOE/NV has reported a total of 56 occurrences as UOs since the start of ORPS. They were reported under the following ORPS reporting areas: Safeguards/Security at 52 percent, Environmental at 22 percent, Facility Condition at 12 percent, Personnel Safety at 7 percent, Facility Status at 3 percent, Value Basis Reporting at 2 percent, and Cross-Category Items at 2 percent. **Occurrences can and have been reported under more than one ORPS reporting area.**

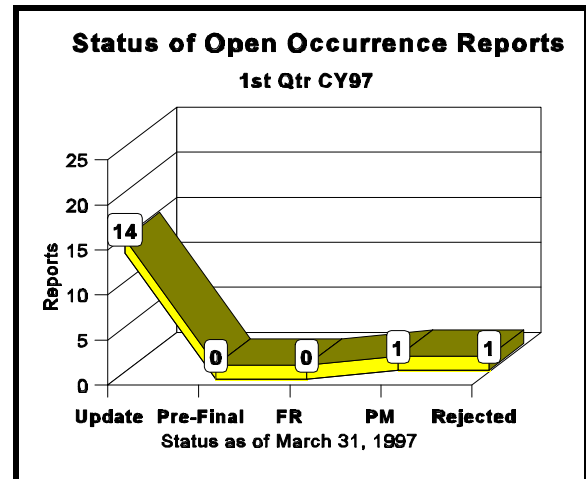
## Off-Normal Occurrence

DOE/NV categorized nine events as Off-Normal Occurrences (ONs) this quarter. They were reported under the following ORPS reporting areas: three under Facility Condition, two under Personnel Safety, two under Nuclear Explosive Safety, two under Cross-Category Items, and one under Environmental.

DOE/NV has reported a total of 601 occurrences as ONs since the start of ORPS. They were reported under the following ORPS reporting areas: Facility Condition at 31 percent, Environmental at 21 percent, Personnel Safety at 15 percent, Safeguards/Security at 10 percent, Cross-Category Items at 10 percent, Personnel Radiation Protection at 5 percent, Value Basis Reporting at 4 percent, Transportation at 2 percent, Facility Status at 1 percent, and Nuclear Explosive Safety at 1 percent.

## TRENDING AND ANALYSIS

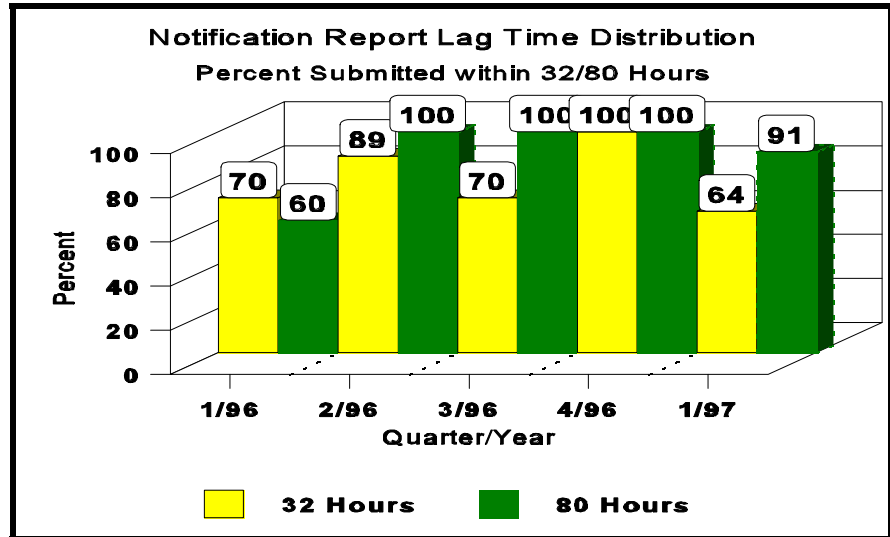
Since the start of ORPS, DOE/NV has reported a total of 657 occurrence reports. As of March 31, 1997, 641 occurrence reports have been completed. Of the sixteen reports that remain open, fifteen are being completed and one has been rejected pending further action.



## REPORT TIMELINESS

### Notification Reports

DOE Order 232.1 requires that a Notification Occurrence Report (NOR) be submitted before the close of the next working day from the time of categorization (not to exceed 80 hours). During this quarter, DOE/NV and its contractors/users submitted 64 percent of the NORs by the close of the next business day and 91 percent of the eleven NORs were reported within the 80 hour criteria.



**Notification Report Lag Time**  
**1st Qtr CY97**

HOURS	0-5	6-10	11-15	16-20	21-25	26-30	30+
REPORTS	5	1	0	0	1	0	4

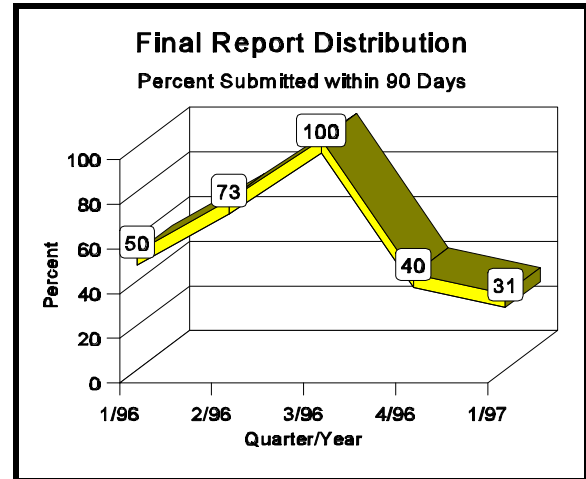
### Update Reports

An Update Occurrence Report (UOR) is to be completed by the FM when significant and new information is available or upon request by DOE/NV. A UOR will be submitted within 45 days after categorization if the required analysis of an event cannot be completed. The report will explain the delay and provide an estimated date for submittal of the Final Occurrence Report (FOR).

## Final Reports

A FOR is to be completed by the FM and submitted to the FR when practical, but within 45 calendar days after categorization. The FR will review, approve, add any comments, and forward the FOR to the PM within 10 calendar days of receipt. The PM will review, approve, and add any comments to the FOR within 14 days of receipt. If the FOR is not approved by either the FR or the PM, they will return it to the FM with an explanation for the disapproval. A FOR is considered final when the FM, FR, and/or PM have all approved and signed the report.

DOE Order 232.1 establishes a 45-calendar day criterion for completion of FORs by the FM. DOE/HQ established an internal goal that 90% of reports should meet the 45-day criteria. The Defense Programs Occurrence Analysis Report, published quarterly to compile all Defense Programs reporting, uses a 90-day deadline as a reference target. The QT&AR follows that criterion here for comparative purposes. Analysis of data for this quarter shows a decrease from the first quarter a year ago and a decrease from the preceding quarter. Thirteen FORs were submitted during this quarter with an average of 213 days. Four of the FORs met the 90-day criteria and two met the 45-day criteria.

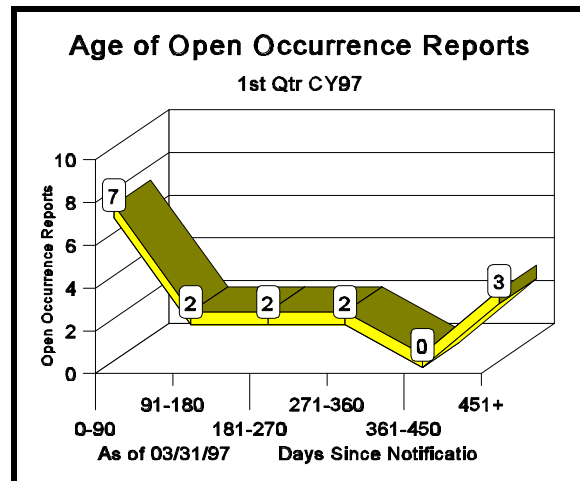


### **Final Report Lag Time 1st Qtr CY97**

DAYS	0-15	16-30	31-45	46-60	61-75	76-90	90+
REPORTS	1	1	0	0	2	0	9

### Backlog of Open Occurrence Reports

As of March 31, 1997, DOE/NV had a total of sixteen open occurrence reports. Nine reports have been open longer than 90 days. Two reports, still in the pre-final stage, have been open more than 500 days. One open occurrence report is rejected and awaiting further action. The remaining thirteen open occurrence reports are awaiting an update or pre-final action.

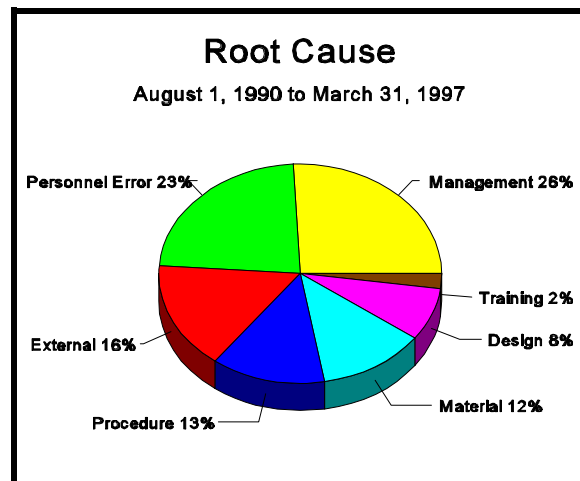


### ROOT CAUSE ANALYSIS

Since the start of ORPS, DOE/NV and its contractors/users have reported 646 root causes. Management Problem dominates the root causes at 26 percent. The subgroups identified most often are (1) Inadequate Administrative Control and (2) Policy Not Adequately Defined, Disseminated, or Enforced.

Personnel Error also dominates at 23 percent. The three subgroups identified most often are (1) Inattention to Detail, (2) Procedure Not Used or Used Incorrectly, and (3) Other Human Error.

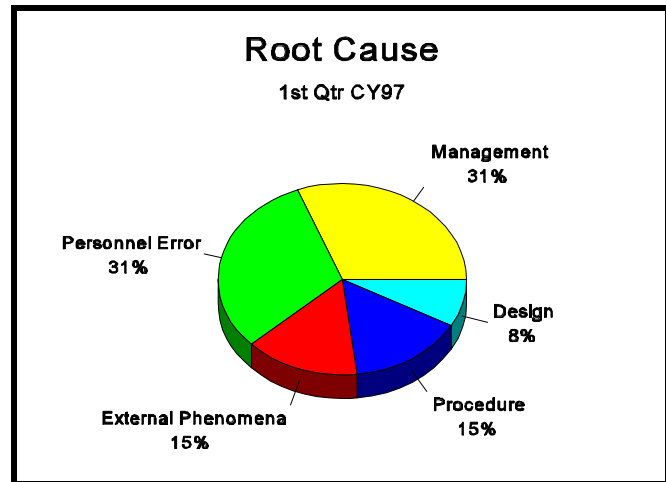
The other predominant root cause is External Phenomena at 16 percent. The subgroups identified most often are (1) Weather or Ambient Condition and (2) Theft, Tampering, Sabotage, Vandalism.



The remaining reported root causes are Procedure Problem at 13 percent, Equipment/Material at 12 percent, Design Problem at 8 percent, and Training Deficiency at 2 percent.



The trend for the thirteen root causes reported this quarter differs slightly from the total analysis. Management Problem and Personnel Error dominate at 31 percent each. The other predominant root causes are Procedure Problem and External Phenomena at 15 percent each. Design Problem was reported at 8 percent.



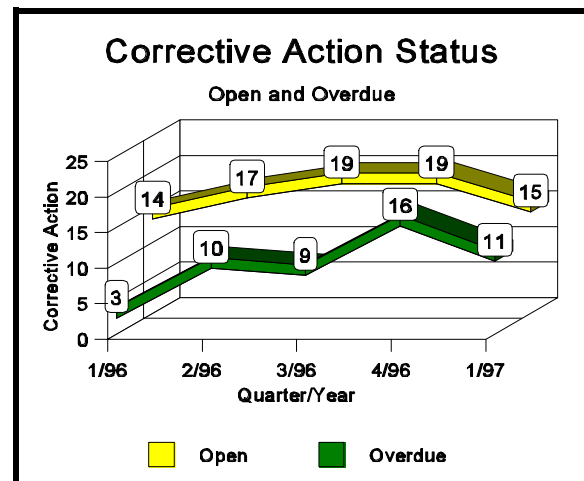
### Root Cause Distribution Breakdown by Category

Material		Procedure		Personnel		Design		Training		Management		External		Other	
Total	Qtr	Total	Qtr	Total	Qtr	Total	Qtr	Total	Qtr	Total	Qtr	Total	Qtr	Total	Qtr
77	0	81	2	146	4	50	1	16	0	167	4	105	2	4	0

## CORRECTIVE ACTIONS

As of March 31, 1997, DOE/NV had fifteen open corrective actions. Eleven open corrective actions are overdue. Note that because revised target completion dates are included each quarter, comparisons between quarterly corrective action status data are not meaningful. The distribution of actions changes whenever the status is updated.

The instruction to update corrective actions follows.



### To enter ORPS

1. Double click on the Reflection 1 Icon.
2. At prompt DOE XL: enter USERID statement and press Enter.
  - a. Enter password and press Enter.
3. Press Enter until the Operational Event Information Systems Menu appears.
4. Enter 1 for ORPS and press Enter.
5. Enter number for Update Corrective Actions and press Enter.
6. A list of outstanding corrective actions will appear.
7. Press F2 (MARK) for the reports to review.
8. Press F7 (REVIEW).
9. Update the actions as appropriate.
10. Press F7 (UPDATE).
11. Continue updating outstanding corrective actions or press F8 (PREV MENU).

### To exit ORPS

1. Press F8 (PREV MENU).
2. Enter E for End and press Enter.
3. Enter E for End and press Enter.
4. At prompt XL: enter **bye** and press Enter.

## PROCEDURE FOR SUBMITTING DRAFT OCCURRENCE REPORTS

Notify the EOC personnel by telephone at 295-1422 that a draft occurrence is E-mailed. The E-mail address for the EOC is EOC@nv.doe.gov

The procedure to submit a draft occurrence report by E-mail to the EOC follows:

(1) select the appropriate occurrence report from the PC ORPS program, (2) select the Print Option, (3) select Print to File, and (4) attach the file to the E-mail. Remember to give the file a "wpd" extension. Address any questions to the EOC personnel at 295-1422 or Deborah Binder at 295-6351.

## DOE/NV OCCURRENCE REPORTS

verbatim from DOE/NV occurrence reports

Eleven events were categorized under ORPS for this quarter, two as UOs and nine as ONs. Address any questions or comments regarding these events to Deborah Binder at 295-6351 or the EOC personnel at 295-1422. A description of occurrence for each event follows.

### **Diesel Fuel Spill (NVOO--BNLV-NTS-1997-0002)**

**Description of Occurrence:** On August 26, 1996, a diesel fuel generator in the Underground Water Monitoring Site developed a leak in the fuel supply line and fuel leaked into the containment area made of tarpaulin. After the fuel was pumped out, a 6-inch tear in the tarpaulin was noticed. The amount of fuel that leaked onto the soil surface below was unknown. The tear was repaired and Waste Management was notified. It was determined then the spill could not be reached or excavated. The generators and containment tarp were removed. The project was completed and equipment was removed this month. The surface spill area was 5 feet wide by 15 feet long.

### **Contaminated Drums in Area 23 Storage Yard (NVOO--BNLV-NTS-1997-0003)**

**Description of Occurrence:** During operations at T-tunnel, the military was conducting a non radiological explosive experiment. To contain the blast fragments, a pod of four (4) 30 gallon drums; one (1) loose 30 gallon drum; and one (1) 10 gallon drum were obtained from the Area 23 salvage yard. The radiological technician supporting the operation did a survey of the drums after the experiment had taken place and discovered radioactive contamination levels above release limits specified in the NV/YMP Rad Con Manual. Using a portable instrument, maximum levels of

34,000 dpm/100 sq cm Beta - 500 dpm/100 sq cm Alpha and 0.4 mR/hr were detected on two (2) of the six (6) drums which are above the fixed plus removable unrestricted release limits. Swipes of the external and accessible internal areas of the drums showed a maximum of 135 dpm/100 sq cm Beta and 17 dpm/100 sq cm Alpha which are below unrestricted removable release limits. No spread of contamination was detected on personnel, equipment, or material. The drums were moved to a Radiological Material Area at T-tunnel to await final disposition.

**Vehicle Incident  
(NVOO--BNLV-NTS-1997-0004)**

A Bechtel Nevada employee was driving a government vehicle from the NTS to the North Las Vegas Complex on Highway 95, when he rolled over the vehicle near mile marker 127. This incident happened at 2223 hours on March 25, 1997. The employee was taken to a local hospital with minor injuries. Individual is in stable condition with a bruised lung, cracked ribs, and contusions. The vehicle was towed to an impound area in Amargosa, Nevada.

**Theft of Computer Equipment  
(NVOO--GONV-GONV-1997-0001)**

On March 12, 1997, it was reported to DOE/NV Security that a laptop computer worth approximately \$2,700 had been stolen from the office of a DOE Office of Inspector General (OIG) employee while he was away from his desk. He was gone less than fifteen minutes and returned to find the laptop, travel case, and power pack missing. A search of the immediate area was negative and the local police were notified. The computer did not contain any sensitive data. Location of the theft was 2805 Westwood Drive, Las Vegas, Nevada.

On March 21, 1997, it was reported to DOE/NV Security that ten computer cases at 2801 Westwood Drive, Las Vegas, Nevada, were found with missing parts, and three of the cases had been completely gutted. This prompted an inventory of all computers and parts that were being used for parts for repairs and upgrades. The results of the search and inventory accounted for all missing equipment, less approximately \$3,000 worth of parts.

**Inadvertent Release of High Air Pressure Near Worker  
(NVOO--LANV-NTS3-1997-0001)**

On December 18, 1996, during an operational check of the proportional valves in the U1A tunnel pressurization system, an inadvertent release of very high air pressure occurred. Based on the design of the system it has been determined that between 110-

120 pounds per square inch (psi) was unexpectedly released from a proportional valve (MPV2) found approximately 10 feet from a worker associated with the test. Debris flew uncontrollably in the area and the proportional valve was damaged. Although there was no impact to the health and safety of the worker in the area, the Facility Manager determined the event as a near-miss. This was based on the proximity of the underground worker at the time of the event, commingled with concern that the worker had just previously been working near the path of the flow. There was no impact to the environment, and minimal programmatic impact.

### **Non-injury Vehicular Accident (NVOO--SDNL-TTRO-1997-0001)**

A Tonopah Test Range Security Police Officer while on patrol was coming down Antelope Peak Road near the base of the peak. This is a dirt road with steep inclines. None of the curves were marked with reflective markers and the driver failed to recognize a turn when he should. When he did start to slow, he shifted to a lower gear and applied the vehicle's brakes. The vehicle, equipped with an anti-lock braking system (ABS), did not brake as expected. Instead, the vehicle hopped and slid to the outside edge of the road. The vehicle nearly stopped on a steep incline portion of the embankment. The steep incline caused the vehicle to slide down the embankment's side and rolled over once. The driver wearing a seat belt was not injured.

### **Suspension Under Personnel Assurance Program Order (NVOO--WSIN-NTS2-1997-0001)**

On Saturday, January 11, 1997, at approximately 0600 hours, an incident of "horseplay" (without malice) with a knife occurred in Building 1000, Area 23 at the Nevada Test Site (NTS). The incident involved a Personnel Assurance Program (PAP) Security Police Officer (SPO) and a Protective Force Lieutenant at the weapon load and unload area of the muster room in Building 1000. This incident was not reported to WSI/NV senior management until approximately 1800 hours on the same day. Upon investigation by the WSI/NV night shift captain, the Manager Protective Force Operations (MPFO) was notified. The MPFO recommended, since a knife was involved, the Nye County Sheriff's Office (NCSO) should be notified and the captain should place the SPO on administrative suspension. A NCSO Deputy arrived at Building 1000 at the NTS, interviewed the SPO (after advising him of his rights) and other personnel involved in the incident. Information was gathered by the NCSO Deputy and final disposition is pending.

**Suspension Under Personnel Assurance Program Order  
(NVOO--WSIN-NTS2-1997-0002)**

On Saturday, January 18, 1997, at approximately 2000 hours, a vehicle accident occurred involving an off duty Personnel Assurance Program (PAP) Security Police Officer (SPO) on Losee Road in North Las Vegas, Nevada. The SPO ran into the rear of a tractor-trailer rig while driving his automobile. Alcohol was involved. The SPO received minor injuries, was transported to a local hospital and released. After the initial investigation, it was determined that the SPO should be administratively suspended from the PAP program.

**Accidental Discharge, M-60 Machine Gun  
(NVOO--WSIN-NTS2-1997-0003)**

On Friday, February 28, 1997, at approximately 1345 hours, an incident with an M-60 Machine Gun (MG) occurred during range firing on Range C, WSI/NV Training Academy, Area 23 at the Nevada Test Site. During the training, an M-60 MG failed to fire. The firer took immediate action and the weapon again failed to fire. An Assistant Instructor (AI), after moving all trainees in a safe area behind the firing line, again took immediate action by clearing the gun (thought he had seen a round eject from the gun while clearing it) and attempted to fire the gun. Again the gun failed to fire. The AI then took remedial action to try to decide the cause of the malfunction. During the remedial action, it was discovered there was a malfunction with the firing pin. The firing pin was repositioned and re-assembly of the gun was initiated. During re-assembly, when the bolt and operating rod released to the forward position, the bolt made contact with a live round in the chamber and the gun discharged (toward the ground, down range). There were no injuries involved in the incident.

**Demonstration/Protest  
(NVOO--WSIN-NTS2-1997-0004)**

On Sunday, March 23, 1997, at approximately 0930 hours, a passive demonstration was held by approximately 41 personnel at the entrance to the Nevada Test Site in Area 22. Members of the protest group were affiliated with the Nevada Desert Experience. The demonstration was peaceful. However, 26 personnel were arrested for trespassing, cited, and released. There were no injuries reported. All demonstrators departed the area at approximately 1205 hours.

**Demonstration/Protest  
(NVOO--WSIN-NTS2-1997-0005)**

During the period March 28 through 31, 1997, a series of demonstrations were held at the Nevada Test Site (NTS), (cattle guard, Old Mercury Highway, and Army Well No. 1 and Jackass Flats Highway) in Area 22. Members of the protest groups were associated with the Nevada Desert Experience (NDE), Shoshone Indian Nation, and the Nuclear Abolition organization. The following is a summary of daily activities and arrests for the demonstrations. There was a total of 86 persons arrested with an estimated high of 250 demonstrators at any one time.

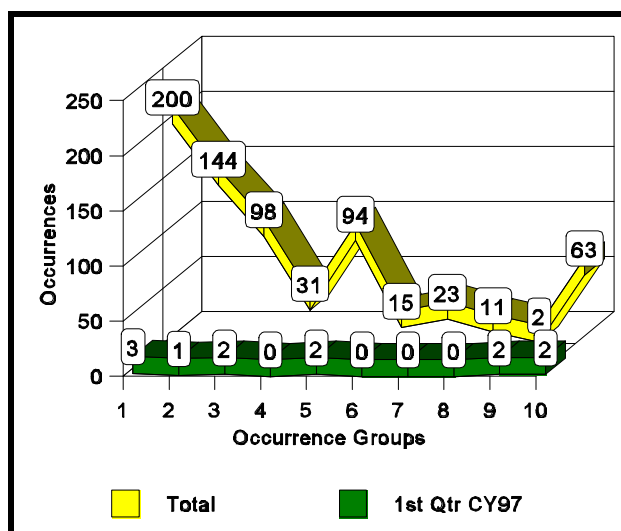
On Friday, March 28, 1997, between 80 and 100 personnel held a passive demonstration at the cattle guard. Twenty personnel were arrested for trespassing, cited, and released. There were no reported injuries. The demonstration started at 1500 hours and ended at 1630 hours.

On Sunday, March 30, 1997, approximately 250 personnel held a passive demonstration at the cattle guard. Sixty-six personnel were arrested for trespassing, cited, and released. There were no reported injuries. The demonstration started at approximately 1215 hours and ended at 1530 hours.

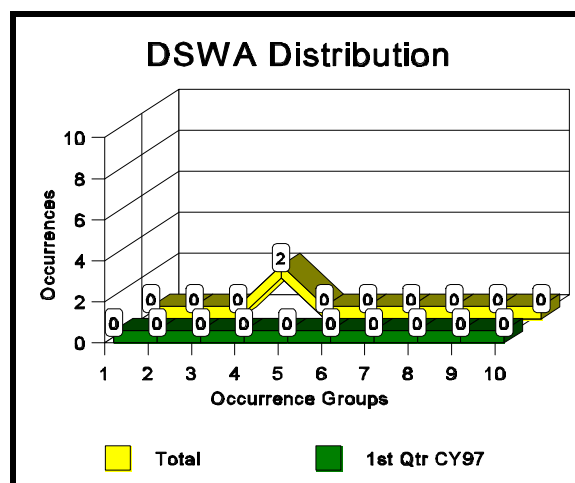
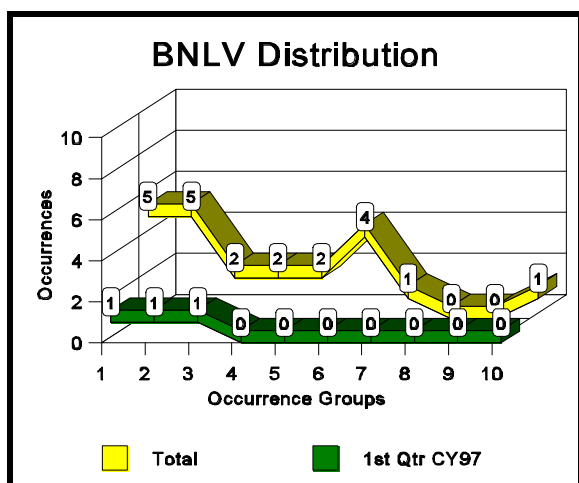
On Monday, March 31, 1997, approximately 200 personnel held demonstrations at the cattle guard, Old Mercury Highway, and near Army Well No. 1 and Jackass Flats Highway. Protestors blocked vehicular traffic at these locations by establishing tepees at the entrance of each location. All three sites were effectively blocked at approximately 0400 hours. WSI/NV Protective Force personnel removed approximately 35 demonstrators from the entrance to Old Mercury Highway at 0550 hours and vehicle traffic to the NTS was opened then. The demonstrators on the Mercury Highway entrance opened at approximately 0625 hours and traffic was rerouted from Old Mercury Highway then. No protestors were arrested. One demonstrator was injured when she fell off the tepee on Mercury Highway and was transported to University Medical Center in Las Vegas, Nevada. There was one additional injury reported to a member of the WSI/NV Protective Force (a minor muscle strain to the right forearm.) Demonstrators departed the area at approximately 0800 hours.

## DISTRIBUTION OF CATEGORIES

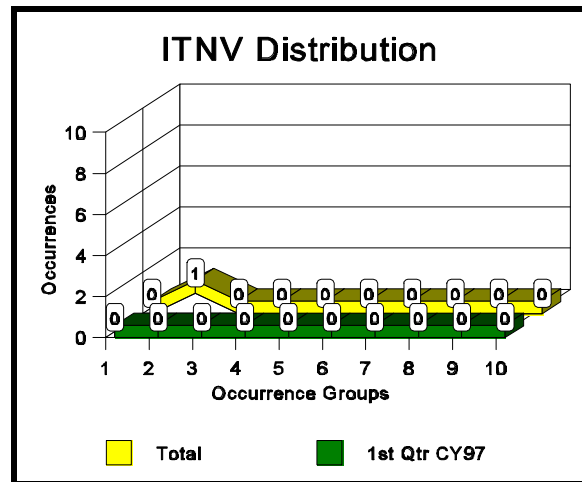
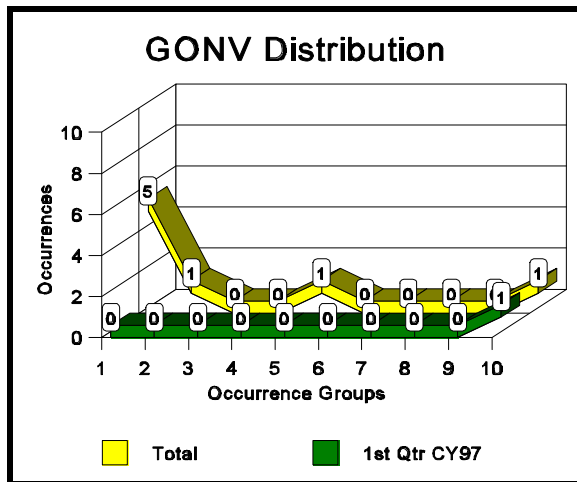
**Distribution of Categories**  
**August 1, 1990 to March 31, 1997**



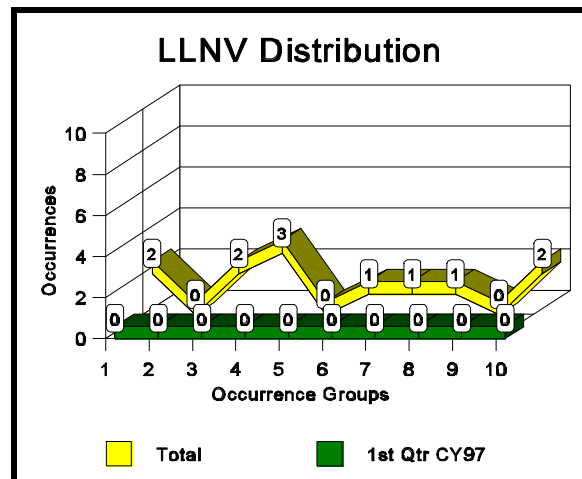
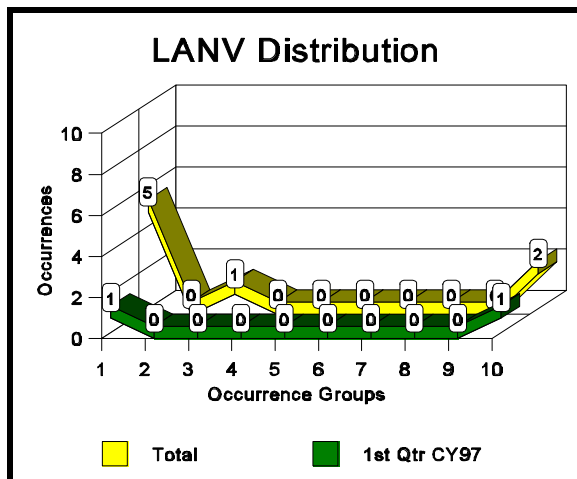
**Occurrence Group-Codes:** 1 = Facility Condition; 2 = Environmental; 3 = Personnel Safety; 4 = Personnel Radiation Protection; 5 = Safeguards and Security; 6 = Transportation; 7 = Value Basis Reporting; 8 = Facility Status; 9 = Nuclear Explosive Safety; 10 = Cross-Category Items.  
***Occurrences may be reported under more than one Occurrence Group Code.***

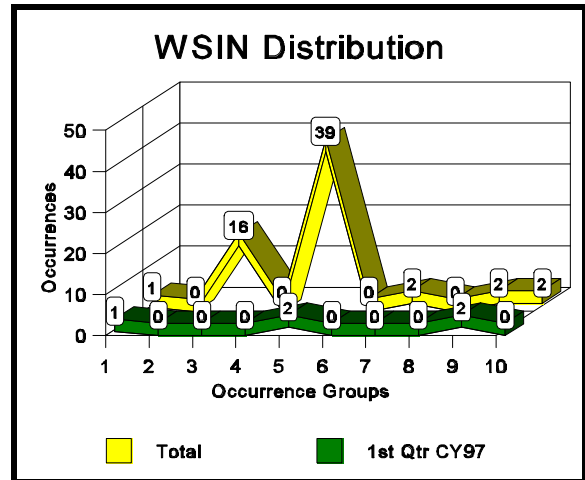
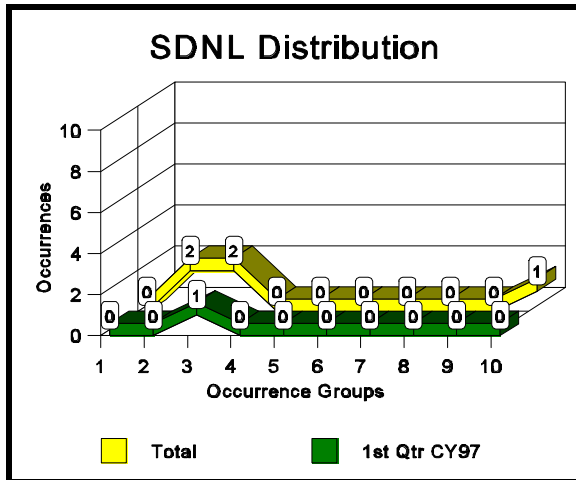






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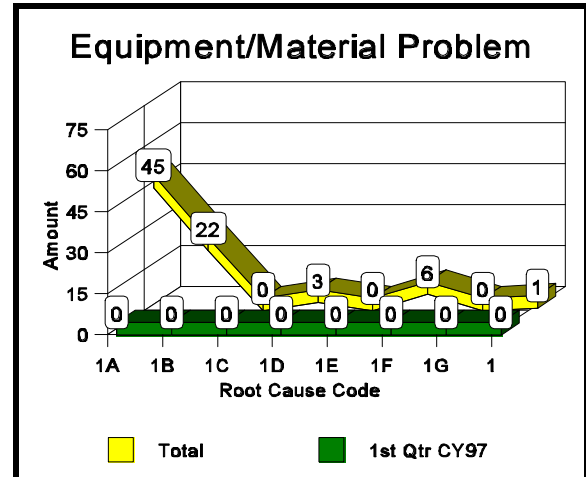


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***Occurrences may be reported under more than one Occurrence Group Code.***

## ROOT CAUSE CODES AND DEFINITIONS

**Equipment/Material Problem:** An event or condition resulting from the failure, malfunction, or deterioration of equipment or parts, including instruments or material.

- 1A. **Defective or Failed Part:** A part/instrument that lacks something essential to perform its intended function.
- 1B. **Defective or Failed Material:** A material defect or failure.
- 1C. **Defective Weld, Braze, or Soldered Joint:** A specific weld/joint defect or failure.
- 1D. **Error by Manufacturer in Shipping or Marking:** An error by the manufacturer or supplier in the shipping or marking of equipment.
- 1E. **Electrical or Instrument Noise:** An unwanted signal or disturbance that interferes with the operation of equipment.
- 1F. **Contaminant:** Failure or degradation due to radiation damage or foreign material such as dirt, crud, or impurities.
- 1G. **End of Life Failure:** A failure where the equipment or material is run to failure and has reached its end of design life.
1. Equipment/Material Problems reported prior to 4/1/91.



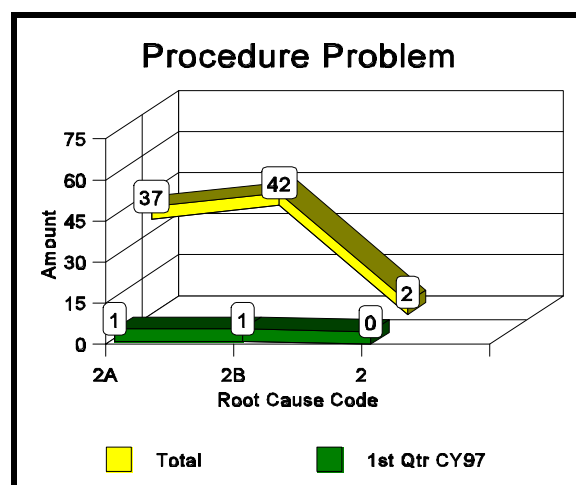
**Procedure Problem:** An event or condition that can be traced to the lack of a procedure, an error in a procedure, or a procedural deficiency or inadequacy.

2A. **Defective or Inadequate**

**Procedure:** A procedure that either contains an error or lacks something essential to the successful performance of the activity.

2B. **Lack of Procedure:** No written procedure was in place to perform the activity.

2. Procedure Problems reported prior to 4/1/91.



**Personnel Error:** An event or condition due to an error, mistake, or oversight.

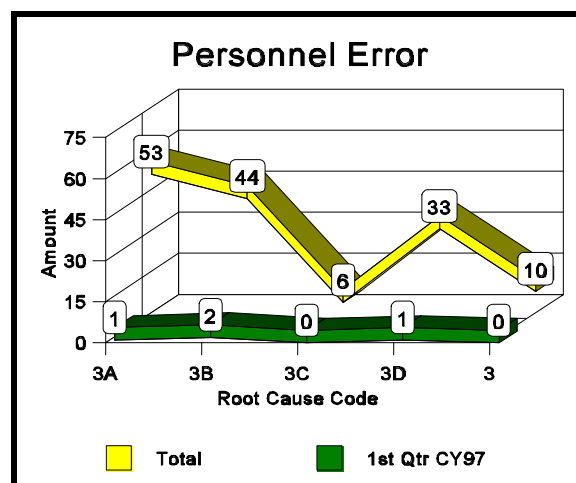
3A. **Inattention to Detail:** Inadequate attention to the specific details of the task.

3B. **Procedure Not Used or Used Incorrectly:** The failure to use or the inappropriate use of written instructions, procedures, or other documentation.

3C. **Communication Problem:** Inadequate presentation or exchange of information.

3D. **Other Human Error:** Human error other than those described above.

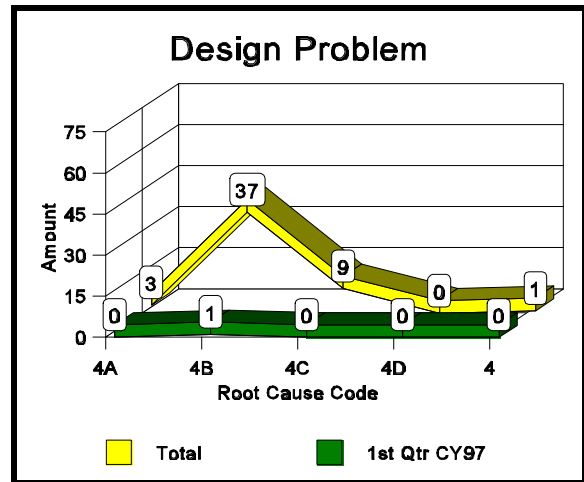
3. Personnel Errors reported prior to 4/1/91.



**Design Problem:** An event or condition that can be traced to a defect in design or other factors related to configuration, engineering, layout, tolerances, calculations, etc.

4A. **Inadequate Work Environment:**

Inadequate design of equipment used to communicate information from the facility to a person (e.g., displays, labels, etc.) as well as inadequate work environment, such as inadequate lighting, working space, or other human factor considerations.



4B. **Inadequate or Defective Design:** A design in which something essential was lacking (defective) or when a detail was included but was not adequate for the requirement (inadequate).

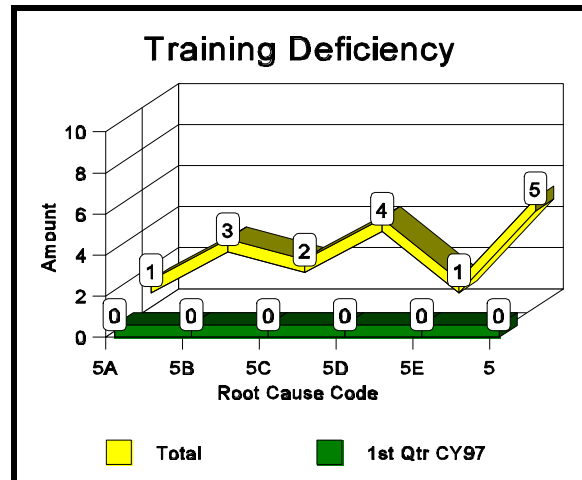
4C. **Error in Equipment or Material Selection:** A mistake in the equipment or material selection only, not to include a procurement error (see Personnel Error (d) Other Human Error) or a specification error (see Design Problem - (d) Drawing, Specification, or Data Errors).

4D. **Drawing, Specification, or Data Errors:** An error in the calculation, information, or specification of a design.

4 . Design Problems reported prior to 4/1/91.

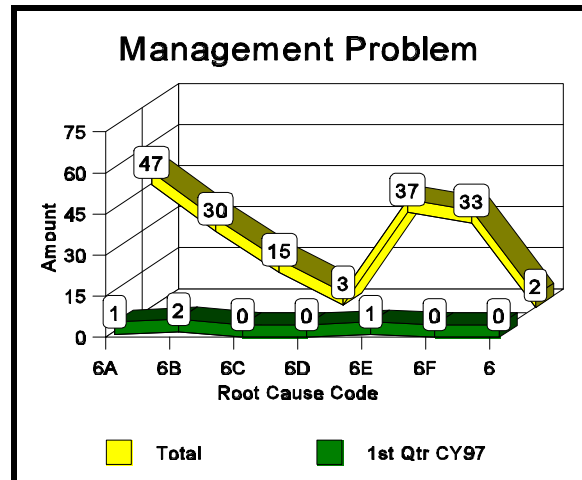
**Training Deficiency:** An event or condition that can be traced to a lack of training or insufficient training to enable a person to perform a desired task adequately.

- 5A. **No Training Provided:** A lack of appropriate training.
- 5B. **Insufficient Practice or Hands-On Experience:** An inadequate amount of preparation before performing the activity.
- 5C. **Inadequate Content:** The knowledge and skills required to perform the task or job were not identified.
- 5D. **Insufficient Refresher Training:** The frequency of refresher training was not sufficient to maintain the required knowledge and skills.
- 5E. **Inadequate Presentation or Materials:** The training presentation or materials were insufficient to provide adequate instruction.
5. Training Deficiencies reported prior to 4/1/91.

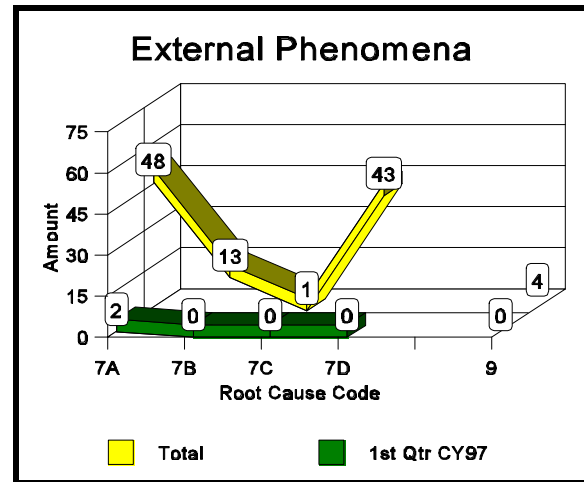


**Management Problem:** An event or condition that can be directly traced to managerial actions or methods.

- 6A. **Inadequate Administrative Control:** A deficiency in the controls in place to administer and direct activities.
- 6B. **Work Organization/Planning Deficiency:** A deficiency in the planning, scoping, assignment, or scheduling of work.
- 6C. **Inadequate Supervision:** Inadequate techniques used to direct workers in the accomplishment of tasks.
- 6D. **Improper Resource Allocation:** Improper personnel or material allocation resulting in the inability to successfully perform assigned tasks.
- 6E. **Policy Not Adequately Defined, Disseminated, or Enforced:** Inadequate description, distribution, or enforcement of policies and expectations.
- 6F. **Other Management Problem:** A management problem other than those defined above.
6. Management Problems reported prior to 4/1/91.



**External Phenomena:** An event or condition caused by factors that are not under the control of the reporting organization or the suppliers of the failed equipment or service.



7A. **Weather or Ambient Condition:**

Unusual weather or ambient conditions, including hurricanes, tornadoes, flooding, earthquake, and lightning.

7B. **Power Failure or Transient:**

Special cases of power loss that are attributable to outside supplied power.

7C. **External Fire or Explosion:** An external fire, explosion, or implosion.

7D. **Theft, Tampering, Sabotage, or Vandalism:** Theft, tampering, sabotage, or vandalism that could not have been prevented by the reporting organization.

**Radiological/Hazardous Material Problem:** An event related to radiological or hazardous material contamination that cannot be attributed to any of the other causes.

8A. **Legacy Contamination:** Radiological or hazardous material contamination attributed to past practices.

8B. **Source Unknown:** Radiological or hazardous material contamination where the source cannot be reasonably determined.

**Note:** There have been no occurrences classified with this root cause for this quarter or any other quarters.

9. Other problems reported prior to 4/1/91.



## SIGNIFICANT OCCURRENCES

excerpts from the DP Monthly Summary Report December 1996

During the daily review of the ORPS Notification Reports, occurrences that warrant the attention of management because of operational or environment, safety, and health significance are singled out and reported to higher management. For the month of December 1996, one such occurrence was identified.

### **Radioactive Contamination Detected on the Fingers of, and Nasal Smears for, an MST-FAC Employee (ALO-LA-LANL-CMR-1996-0041)**

On December 4, 1996, a Materials Science and Technology--Facilities (MST-FAC) employee's right-hand fingertips were contaminated (11,000 dpm/100 cm<sup>2</sup> alpha). Alpha contamination measuring 343 dpm was also detected on nasal smears indicating a potential uptake. The contaminant was plutonium-239.

The MST-FAC employee was assigned to take airflow measurements on an open-front slotbox to ensure that there was enough air flow to conduct an upcoming experiment. The employee unwittingly reached into the slotbox to determine if he could feel air flow from the dryer. Not feeling any air flow and noticing that the dryer's power switch was in the "off" position, the employee touched the dryer with his bare hand in an attempt to turn the unit on. This attempt was witnessed by another employee who told the MST-FAC employee to stop his action immediately.

A Radiological Control Technician was called and surveyed the MST-FAC employee. Contamination was detected on the employee's right finger tips and thumbs. Nasal smears were also taken. The results measured 343 dpm alpha for one nostril and 0 dpm alpha for the other. The employee's finger tips and nostril were successfully decontaminated to no detectable activity. The employee was also issued an initial bioassay kit and scheduled for a whole-body count.

An update report stated that the results of the whole-body count did not indicate a measurable intake of radioactive material and that the employee was allowed to resume work in controlled areas on December 12, 1996.

## LESSONS LEARNED

excerpts from the DOE Lessons Learned Information Services

The following section discusses selected final reports that go beyond the minimum requirements of DOE Order 232.1 in providing lessons learned worth distribution to the DOE community.

## **Skin Contamination Caused by Perspiration and Poor Work Practice**

**Lessons Learned:** Heavy perspiration of workers coupled with poor work practices can lead to skin contamination incidents.

**Discussion:** On April 1, 1994, a subcontractor employee discovered skin contamination on both of his thighs during his personal radiological exit survey. The employee had been lifting piping and resting it on his thighs during lifting and he had been perspiring heavily during his work activities.

The employee had just completed work activities which included removing process piping and lifting reactor lids. He was wearing the required personal protective equipment (PPE) during his work activity, including a pair of inneralls and coveralls, and he had changed his outer, cotton work gloves frequently. However, the excessive sweat on the cotton-polyester protective coveralls allowed the contamination to soak through. The employee's use of his legs to maneuver heavily contaminated materials was a poor work practice that contributed to the contamination incident. Several other employees were performing similar activities and did not become contaminated.

**Recommended Actions:** The incident reveals the necessity of properly evaluating the PPE selected when working in direct contact with product materials. However, consideration must also be given to the offset of minor skin contamination versus extreme heat-stress hazards associated with more impermeable PPE. Personnel should avoid direct contact with product materials. However, if contact with a product is required, additional PPE such as impermeable leg coverings and gloves must be used.

The Project Management Contractor presented additional training to affected field operations workers which focused on radiological contamination and safety issues.

## **Anti-Contamination Clothing Health and Safety Issues**

**Lessons Learned:** All individuals who enter contaminated areas should be aware that compliance with requirements for anti-contamination (anti-C) clothing must not compromise other aspects of workplace health and safety. Individuals should not hesitate to voice concerns about health and safety issues.

**Discussion:** As part of the implementation of the Radiological Control (RadCon) Manual, requirements for anti-C clothing have been upgraded. Coveralls, hoods, gloves, and new overshoes are now standard dress-out for entry to contaminated areas. At issue is the perception that these new requirements may adversely affect workplace health and safety. Concerns include heat stress and other hazards associated with the wearing, donning, and doffing of anti-C clothing.

An interdisciplinary team addressed worker concerns regarding health and safety impacts of anti-C clothing and evaluated work place conditions. The team's members were drawn from the Industrial Safety, Industrial Hygiene, Health Services Nuclear Criticality Safety, and Radiological Control Departments and from the Atomic Trades and Labor Council. Concerns assessed by the team include the following:

1. **Heat Stress.** Careful job planning that includes the use of heat stress controls, when appropriate, is the standard strategy used in the nuclear industry to manage heat stress. Anti-C clothing does interfere with the body's ability to cool itself. Work time limits and the use of body cooling devices should be used to reduce heat stress in hot work environments. The primary causes of heat stress are lack of proper acclimatization, infrequent rest breaks, and inadequate fluid intake.

If an individual begins to feel symptoms of heat stress, he or she should immediately notify the nearest coworker, exit the area as quickly as practical, notify the supervisor, and rest in a cool area.

2. **Fit of Clothing.** Potential hazards associated with anti-C clothing are significantly reduced when anti-C clothing is properly fitted to the individual. Wearing anti-C clothing that is too large causes mobility and tripping hazards. Each individual is responsible for selecting coveralls, gloves, and shoe covers that provide a proper fit. Minor adjustments, may be made to achieve a good fit; however, no item of clothing should be worn that is several sizes too large. If the needed size of an article of anti-C clothing is not available, the individual should not attempt to use ill-fitting clothing and should immediately notify the supervisor of the problem. Also, clothing should not be torn to shorten sleeves and legs.
3. **Problems Encountered in Donning and Removing Anti-C Clothing.** The anti-C hoods currently used are "one size fits all." Hoods should be adjusted so that they fit snugly around the face and do not obstruct vision. Adjustment of the hood by a second person (using a "buddy" system) during the donning of these hoods is recommended.

Maintaining balance while donning and doffing anti-C clothing is a challenge for some individuals. When feasible, benches or other seating should be provided in the Radiological Buffer Area for use when donning anti-C clothing. In the contaminated area near the step-off pad, hand rails for use in maintaining balance while removing anti-C clothing are recommended.

**Recommended Actions:** Potential health and safety issues associated with the use of anti-C clothing must be identified and addressed prior to the beginning of work. Health and safety are not compromised by the use of anti-C clothing if appropriate actions are taken to ensure that all health and safety aspects are considered when the requirements are developed.

Activities that should consider health and safety issues include the job planning process, the design and configuration of facilities, and the training of, and communication with, workers.

If the potential for heat stress is a concern, the supervisor planning the work should ensure that Industrial Hygiene is included in the job planning process. Individuals should be encouraged to express concerns and suggestions to their supervisors.

## EVALUATION OF INCIDENTS INVOLVING PROTECTIVE CLOTHING

excerpts from *Radioactive Contamination Incidents Involving Protective Clothing* by Los Alamos National Laboratory

**Abstract:** The study focuses on incidents at Department of Energy (DOE) facilities involving the migration of radioactive contaminants through protective clothing. The authors analyzed 68 occurrence reports for the following factors: (1) type of work; (2) working conditions; (3) type of anti-contamination (anti-C) material; (4) area of body or clothing contaminated; and (5) nature of spread of contamination. A majority of reports identified strenuous work activities such as maintenance, construction, or decontamination and decommissioning (D&D) projects. The reports also indicated adverse working conditions that included hot and humid or cramped work environments. The type of anti-C clothing most often identified was cotton or water-resistant, disposable clothing. Most of the reports also indicated contaminants migrating through perspiration-soaked areas, typically in the knees and forearms. On the basis of their survey, the authors recommend the use of improved engineering controls and resilient, breathable, waterproof protective clothing for work in hot, humid, or damp areas where the possibility of prolonged contact with contamination cannot be easily avoided or controlled.

**Survey of Corrective Actions:** The corrective actions identified can be grouped into five general categories: (1) require more layers of protective clothing to be worn, (2) require more frequent self-monitoring and changeout of protective clothing, (3) perform more effective hazard analysis, (4) implement better engineering controls, and (5) use a more effective protective clothing material.

**Conclusions and Recommendations:** This report illustrates how contamination can penetrate protective clothing. Some workers perceive anti-C clothing to be an impermeable shield or barrier protecting against radioactive contamination. However,

this perception is not true. Protective clothing, when improperly used, can easily lead to a skin contamination incident.

Some reports in this survey assert that anti-C clothing only protects against “incidental contact.” However, for some types of work--D&D, maintenance, and construction--it is difficult or impossible to ensure that all contact is incidental. If a worker must scrub a floor on his hands and knees, straddle contaminated equipment, or handle contaminated fibers, then planners should consider better engineered controls and more effective anti-C clothing. As this report shows, a worker who is wearing perspiration-soaked overalls and brushes a contaminated surface may easily become contaminated.

Perhaps these incidents show the value of “less is more.” Multiple layers of cotton and disposable water-resistant protective clothing may only increase the likelihood of a skin contamination incident. Engineering controls and protective clothing that includes waterproof, breathable materials may be an effective option for managers who must balance cost, heat stress, and contamination factors.